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Millennials' Expectations to 5G

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Abstract

The Millennial generation born between 1982 and 2004 has now come of age and has entered the scene as a very influential group due to their number and background as the first generation co-existing with a digital life. This experience gives the Millennial generation a unique basis to formulate requirements and expectations to future digital trends. An illustrative conclusion drawn below is that the Millennials, do not foresee the 5G use cases presented in the typical 5G visions to be of any interest or usage to them. They do not want to pay for these services. Furthermore, privacy and security are seen to be of specific concern to the Millennials discussing 5G.

Keywords: Millennials, 5G, Requirements.

1 Introduction

There is an increasing flow of papers and articles discussing and analyzing the requirements of the Millennials towards services, goods, social organization etc. This reflects that the Millennial generation born between 1982 and 2004 (Strauss and Howe, 1991) has now come of age and has entered the scene as a very influential group due to their number and background.

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Being the first generation co-existing with a digital life, this generation is the first to immediately understand the developments happening in the digital life as well as the technologies, networks, devices and services which create this. This experience gives the Millennial generation a unique basis to formulate requirements and expectations to future digital trends. Therefore, it is likely that the Millennial generation who have experience different levels of connectivity can understand and formulate relevant expectations to 5G networks and services – and correspondingly important for providers and producers to listen to these formulations.

This paper provides some insight into the Millennial generation with respect to background and expectations for future digital services and more specifically to the expectations to 5G as a basis for the formulation of more specific requirements. The Millennial generation counts for almost a third of the people on Earth (Burnstein, 2013) which is why this generation constitutes an important part of the business markets and therefore is interesting to target when new ideas and technologies are being developed.

The paper is based on a combination of a literature study which provides insight into what the characteristics are of this generation and an empirical study revealing its expectations to 5G networks and services. This paper is based on Sørensen et al, 2017 by the same authors where further details can be found.

This paper is organized as follows: Section 2 provides an overview of the mobile technology development experienced by the Millennial generation. Section 3 provides an overview of Millennials' expectations to 5G. Section 4 summarizes the overall requirements to 5G, and finally, the conclusions are presented in Section 5.

2 The Millennials and the G's

The Millennial generation has in their life so far been living through the developments from 2G to 4G digital mobile communication systems. The 2G networks provided the users during the 1990's with mobile communication services implying three new experiences: calling from everywhere; receiving calls no matter where you were and connecting to the 'wanted' person not a place connected by a wire. The capacity in the 2G mobile was increased significantly compared to analogue 1G and users' experienced Voice, SMS and mono-media services (Kim et al, 2010). Through the development to 3G, the 2.5G brought the Internet into the mobile communication even though it was still optimized for communication. The 3G (introduced in 2002)

provided spectra improvement by use of smaller cells and based on the CDMA2000EV/DO and WCDMA UMTS as platforms for 3G (Kim et al, 2010). In these years, the smartphones were introduced to markets: Apple introduced the iPhone with its game-changing eco-system in 2007 and just a year after the first Android phones were introduced (the Guardian, 2012). The 4G networks introduced in the years 2010–2015, provided a set of standards to be met and an offering of 100Mb/s for individuals on the move and supplies 1Gb/s to a stable location meaning that Internet access on the move is no longer a somewhat constrained possibility as in 3G, but a truism. With this, the Millennial users have experienced a significant change in communication possibilities and behaviour – now being able to video stream, use the cloud-based services, do real-time gaming and multi-personal video calls to mention a few.

The coming 5G vision is still broad. However, some researchers assume a provision of at least 1000 times higher wireless area spectral efficiency, and up to 10 times lower energy consumption per service (Liu et al, 2016). Furthermore, a number of use cases – or verticals are predicted to move into the quality of experience (as presented by Pierucci, 2015). This is the background for the technology development of the Millennial generation.

3 Millennials and 5G

In the literature, many authors have tried to characterize the Millennial generation:

The Pew Research (2014) made a survey which resulted in a long list of characteristics of the Millennials. Some of these characteristics are (PewResearch, 2014):

- 55% of the Millennials have posted a “selfie” on a social media site
- Millennials are the first to have a higher level of student loan debts, poverty and unemployment and lower levels of wealth and personal income than the two preceding generations at the same time in their life cycle
- Millennials are generally optimistic about the economy. Around 80% of these say that they have enough money to lead the lives they want. On the other side, they do not believe that there will be money in the Social Security Systems by the time they will have to retrieve
- Millennials are a diverse group with many differing views.

In a study by Nielsen (2014), it was found that:

- Millennials are more likely to visit restaurants with easy Wi-Fi and chains with app usage
- Millennials do not shop more online than other generations – they prefer to visit the physical shops
- They live typically in urban areas and therefore do not own cars or their house/apartment. They prefer to rent and are in favour of being green and act environmental correct
- Technology is inherent in the Millennial generation and more than 74% of these say that the new technology makes their life easier and 54% think that new technology helps them be closer to their friends and families.

In a focus group made by Sørensen et al. (2017) (where also the details of the focus group can be found) the following characteristics were found:

- The Millennials think that the vision of 5G presented a sort of utopia, a new way of life and a mobile broadcast revolution
- The Millennials, however, are pessimistic towards the achievability of the 5G visions – they think they have seen the same visions when 3G and 4G were coming up and do not feel these were fulfilled.
- They express concern that 5G will not be useful to them.
- They express a certain uncertainty about the business models which could be developed with the 5G services
- Generally, they are satisfied with the connectivity as it is now (4G), and they are satisfied using Wi-Fi and VoIP and cannot see the need for Voice over LTE for example

It will be a mobile evolution (not a revolution)
It will provide higher data rates
Will provide greater capacity for the IoT (think IoT already exists)
Generally pessimistic about the achievability of the visions presented in a 5G service provider video
They cannot see how 5G can be useful to them (perhaps to specialised technical use cases but not them personally)
They prefer lower battery consumption to data rates

Figure 1 Millennials on 5G – selected Focus Group Views (Sørensen *et al.*, 2017).

- The Millennials express concern towards the personal safety in relation to 5G use cases. They are particularly concerned about unforeseen threats or latent threats which cannot be foreseen now; and the lack of trust in current security initiatives.
- Specifically, concerns about privacy and security are expressed. Some mention they are concerned about apathy by other users with respect to personal data security, and that there is no privacy control or solutions for security envisioned for 5G.
- The Millennials express specifically the need for better battery consumption on devices and things with 5G. They prefer lower battery consumption to data rates.

The above-mentioned results are linked to discussions with an international group of Millennials based in Denmark. There may be cultural, social and national differences which should be looked into through different group settings.

4 Requirements for 5G

Based on the above, a number of requirements that Millennials have expressed to 5G can be identified:

- They generally expect the Internet development trends to continued: They expect fast developments in technologies and networks but do not foresee 5G to be something special – just a continuation of what is already around
- They do not have a manifest need for higher data rates
- There is an expectation that 5G can be offered to the customers through different variations of network combinations and that this can form the possibility for service providers to offer different price combinations to the customers
- Privacy is important for the Millennials, and they expect 5G services to be easy to handle and that there is some sort of privacy as a default
- Security is a factor which is expected to be addressed and dealt with in affiliation with the development of 5G
- They generally are satisfied with the 4G and ubiquitous connectivity they can use. They do not see 5G be of personal use or interest.

Furthermore, the Millennials expect for the business models used for 5G that the users will not be forced to pay extra for this connectivity.

5 Conclusion

The analyses in this article lead to the conclusion that Millennials generally do not see 5G as anything special but just as a natural development of the current connectivity. Based on their experience of mobility as a truism – something that is just there- they expect that the 4G development will continue as a natural progression. The Millennials, however, do not foresee the 5G use cases presented in the typical 5G visions to be of any interest or usage to them. They do not want to pay for these services. Furthermore, privacy and security are seen to be of specific concern to the Millennials discussing 5G. In the 5G visions generally offered it is impossible to keep the data secure and private; when one can't keep track of what information service providers have, where it is and what its value is. The standard should build and/or increase users' trust in using digital services. The European Union has taken a step towards recognition of the value and importance of personal data by introducing General Data Protection Regulation (GDPR). Implementation of such initiatives in 5G standard around the globe will certainly elevate the trust in the user of the technology.

This article is based on a literature study as well as empirical work discussing 5G with groups of Millennials. However, much literature and also our focus groups are based on information and input from Millennials with a Western-oriented mind and culture. Future work should look into the variety of Millennials across the world to provide a better understanding of the market challenges and requirements for 5G.

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Biographies



Knud Erik Skouby is professor and founding director of center for Communication, Media and Information technologies, Aalborg University-Copenhagen – a center providing a focal point for multi-disciplinary research and training in applications of CMI. Has a career as a university teacher and within consultancy since 1972. Working areas: Techno-economic Analyses; Development of mobile/wireless applications and services; Regulation of telecommunications

Project manager and partner in a number of international, European and Danish research projects. Served on a number of public committees within telecom, IT and broadcasting; as a member of boards of professional societies; as a member of organizing boards, evaluation committees and as invited speaker on international conferences; published a number of Danish and international articles, books and conference proceedings. Editor in chief of Nordic and Baltic Journal of Information and Communication Technologies (NBICT); Board member of the Danish Media Committee. Chair of WGA in Wireless World Research Forum; Dep. chair IEEE Denmark. Member of the Academic Council of the Faculty of Engineering and Science, AAU.



Lene Tolstrup Sørensen is associate professor at CMI (Center for Communication, Media and Information Technologies), Electronic Systems, at Aalborg University Copenhagen. She holds a Ph.D. in Engineering from DTU (Technical University of Denmark) and has specialized in Interaction Design, and software engineering and usable privacy. Sørensen has been a member of IEEE for many years. Furthermore, within the last 10 years, she has worked closely with the Wireless World Research Forum on for example requirement analyses of new technologies. Sørensen has published more than 100 scientific papers, reports and books.



Samant Khajuria is a Cybersecurity Specialist at Terma, Denmark dealing in aerospace, defense, and security sector. He earned his Bachelor degree in 2006 in electronics and communication from PES Institute of Technology – Bangalore (India); and Master's Degree in Communication networks (specializing insecurity) from Aalborg University in 2008. He was enrolled at Electronics Department, Aalborg University in 2009 and graduated in 2012 with a Ph.D. degree. His research Interests are in the areas of Trust and Privacy, Cryptography, Secure architecture, Risk assessment, Computer and Network Security. Some specific research topics he has addressed in the past include design and cryptanalysis of Single pass Authenticated Encryption Stream ciphers, crypto solutions for reconfigurable devices, securing Software Defined Radios.